COMPARING PARTICULATE MATTER AND OZONE EXPOSURE METRICS FOR PERINATAL EPIDEMIOLOGY IN MEXICO CITY, MEXICO

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Background and Aims: Emerging evidence suggests a relationship between air pollution and adverse birth outcomes, but many studies consider only temporal variation in exposure. We compare spatial methods for assessing exposure to outdoor air pollutants in Mexico City with citywide averages.

Methods: Three metrics of daily exposures to PM_{10}, $PM_{2.5}$, and ozone were calculated for a simulated population (n=1,000) in Mexico City during 2008: the citywide average (CWA) (same for all women), and metrics unique to each of the 1,000 hypothetical residential locations: nearest monitor (NM) and inverse distance weighting (IDW). Correlations, mean differences, and their variances were calculated for each pollutant across all three methods, using citywide averages as the reference.

Results: Ozone was moderately correlated with PM_{10} (r=0.54) and $PM_{2.5}$ (0.65) using CWA. Correlations were lower for IDW (r=0.49 for ozone vs. $PM_{2.5}$; and r=0.42 for ozone vs. PM_{10}) and NM (r= 0.32 for ozone vs. PM_{10}; and r=0.48 for ozone vs. $PM_{2.5}$). In southern zones of the city (low PM_{10}), CWA overestimated PM_{10} by 10.6 and 14.7 $\mu g/m^3$, when compared to NM and IDW, respectively. In the north, CWA underestimated the exposure by 8.3 and 2.4 $\mu g/m^3$ when compared to NM and IDW, respectively. For $PM_{2.5}$ estimated metrics were relatively similar across methods. In southern zones (high ozone), CWA underestimated the ozone exposure by 5.1 ppb compared to NM, and overestimated (2.4ppb) compared to IDW. In the north (low ozone), the CWA overestimates the exposure when compared to NM and IDW (5.2 and 5.1 ppb, respectively).

Conclusions: Depending on residence location, the citywide average could over/under estimate exposure to air pollutants. These differences could bias epidemiological associations if other risk factors for adverse birth outcomes are associated with residence in a particular zone. Future analyses in Mexico City will evaluate kriging, other air pollutants, and implications of seasonal variation for exposure assessment.